Independent Mobility to School and Spanish children: Go, Return, or Both?

Little research about children´s independent mobility (CIM) to school has distinguished between the schoolchildren who only go or return (one way), from those who go and return (both ways) from school. We examined some factors associated with these forms of CIM. We examined the data of 1,106 Spanish girls and boys (8-12 years old). We evaluated CIM to/from school, CIM for outdoor leisure activities, distance from home to school and children´s perceived distance. The following variables related CIM to school: perceived difficulty, attitudes and willingness for CIM to school. The children who showed independent mobility for both ways reported more CIM for their leisure activities, perceived their home as being closer and had a low perception of difficulties compared to those who only commuted to school one way. The predictors for each CIM type also differed. These findings highlight that CIM both ways is a greater form of autonomy.

Keywords. Independent mobility; children; leisure; attitudes; willingness.

Children's independent mobility (CIM) is understood as their freedom to move about with no adults supervising (Tranter and Whitelegg, 1994). The capacity to move autonomously is fundamental for children to develop at all levels: their physical and mental health, their cognitive performance and, above all, so they can construct their socio-emotional relations and sense of community belonging (Risotto and Tonucci, 2002; Prezza, Pilloni, Morabito, Alparone, and Giulani, 2001; Prezza and Pacilli, 2007; Loebach and Gilliland, 2016; Schoeppe Duncan, Badland, Oliver, and Browne, 2014). Independent mobility has been measured in different contexts, and focuses especially on research for outdoor play activities (Bates and Stone, 2015; Page, Cooper, Griew, and Jago, 2010; Witten, Kearns, Carroll, Asiasiga, and Tava´e, 2013). However, CIM to school has been shown to form a significant part of independent mobility and children´s freedom (Marzi, Demetriou, and Reimer, 2018). Therefore, much importance is attached to CIM because childhood is a particularly relevant period during which adult opposition frequently comes up against children developing their autonomy, which is central to build their personal freedom (Helwig, 2006).

When analysing the prevalence of CIM, previous research has shown a decline in several countries (see Shaw et al., 2013; Zubrick et al., 2010), especially for European countries like France, Portugal and Italy (Shaw et al., 2015). A recent study in Spain has shown that 47% of children aged 6-7 years and 60% of those aged 8-12 years independently commute to school (Herrador-Colmenero, Villa-González, and Chillón, 2017). In particular, CIM *to* school has been more frequently analysed than CIM *from* school (i.e., the study of Carver, Panter, Jones, and van Sluijs, 2014 shows travel modes and accompaniment levels on trips to school) as the first displacement has been more frequently studied (Prezza et al., 2010). In Prezza´s study (2010), at both times 1 and 2 (before and after the intervention), the percentage of children who independently went to school was higher than for those who returned (before the intervention to go: 5%, afterwards: 20.8%; before the intervention to

return: 4.2%, afterwards: 9.2%). These results indicate that "go to school" may be a more flexible behaviour that is easier to modify that the "return" behaviour, which may be more determined by other factors like the likelihood of parents picking them up. However, as far as we know, no research has analysed in-depth the children who independently go to *or* from school, and those who autonomously do *both ways*. It is likely that the children who independently commute to school also autonomously enjoy other activities in their neighbourhood, such as outdoor leisure activities (Fyhri and Hjorthol, 2009; Prezza, Alparone, Renzi, and Pietrobono, 2010).

CIM has been previously associated with several factors. Prior research has shown that distance from home to school is the strongest predictor for CIM (Schoeppe et al., 2015). Other studies into different topics, such as active commuting (Fyhri and Hjorthol, 2009), have also shown a significant influence of distance from home to school. Other factors such as socio-demographic variables (age or gender) have also been linked to CIM. Overall, CIM increases with age (Schoeppe et al., 2015; Fyhri and Hjorthol, 2009). In Spain, the age for higher levels of autonomy in children ranges between 10 and 12 years old (Herrador-Colmenero et al., 2017). Previous research has also revealed that boys are granted more CIM than girls (Badland, Oliver, Duncan, and Schantz, 2011; Kytta, 2004). The factors distance, age and gender have been related to CIM for outdoor leisure activities. For example, Brown, Mackett, Gong, Kitazawa, and Paskins (2008) showed that younger boys (aged 8-12) were more likely to autonomously go to their friends´ houses and cycle on main roads than girls. Other variables considered to be important are children`s perceived distance to school and their perceived difficulty for CIM to school. McDonald (2008) showed that perceived distance was associated with less active transportation (although we were interested in the relation with the CIM), and also with perceived safety in relation to walking to school more (Rodriguez and Vogt, 2009). Accordingly, Villanueva et al. (2014) points out the importance of improving

security, making neighbourhoods more walkable (especially for girls) and children's abilities to walk around them to increase CIM.

What children really think about their attitudes, perceptions and willingness for CIM has often been neglected. In order to justify this affirmation, and in accordance with Fusco, Moola, Faulkner, Buliung, and Richichi (2012), children´s experiences are not often included in school travel studies. A study performed in Auckland, New Zealand, investigated how children travelled to school and how they would like to travel. Its findings revealed that more than half the participants did not like the way they travelled to school (Mitchet, Kearns and Collins, 2007). According to Villanueva et al. (2014), girls and boys had more CIM if they felt confident that they could independently travel. As highlighted in a recent systematic review by Crane and Broome (2017), including children's perspectives in research is very important and have recently been the focus of discussion. This has been "taken seriously" in several areas, and is very important for listening authentically to (or understanding) young children by focusing on research design, ethics, theory, methods and data analyses (Colliver, 2017). Better knowing some determinants of CIM from children´s perspectives is particularly interesting, such as their attitudes to IM, and their willingness, reasons and perception of difficulties.

Some previous research works have indicated gender differences in CIM. Overall, boys tend to have more freedom to independently travel and move around than girls (O´Brien, Jones, Sloan, and Rustin, 2000), mostly due to socialisation processes and gender roles (Kilvington and Wood, 2016). Parents tend to treat their children based on gender differences because they are more concerned about their daughter´s safety than when their children are boys by restricting their access to risky situations (McFarland and Laird, 2018). However, a recent systematic review, which analysed some correlates of CIM by considering gender

differences, has found some mixed results, probably due to the heterogeneity of studies, methodologies and designs (Marzi et al., 2018). Therefore, gender should be considered.

In short, CIM increases when children travel to and from school independently (by themselves or with peers), which helps them to experience several positive outcomes in social and cognitive areas and, consequently, helps to improve their proprioception sense and makes them more aware of their environment (Smith et al., 2019). In doing so, children are more able to make decisions about which route is shorter to reach their destination, which way tends to be busy, or even other transformations that are needed to improve their way to school. Children also develop their ability to overcome unexpected events (Mackett, Brown, Gong, Kitazawa, and Paskins, 2007; Mitchell et al., 2007). Several physical, psychological and social benefits for children are also evidenced. As shown by Marzi and Reimers (2018), a rise in the percentage of daily trips made independently increased the daily time spent performing moderate-to-vigorous physical activity. From a more socio-psychological viewpoint, children who travel independently in their neighbourhood socialise more frequently with peers and adults (Bento and Días, 2017), which makes them feel their neighbourhood is more connected and accessible.

Our research is aimed to focus on the children´s perspective, which is often neglected. This is a way of recognising their right to participate in important issues of their life, as established in Article 12 of the UN Convention on Children's Rights, which sets out that children have the right to express their opinion whenever decisions concerning them are taken, and that their views must be taken into account.

The main goal of the present study was to examine the prevalence and factors associated with CIM in a sample of Spanish children according to CIM type (i.e., children who independently go to *or* from school: *CIM-one way*; children who independently go to *and*

from school: *CIM-both ways; non-autonomous* children) and by their threshold distance to independently commute to school.

Method

Study Design

The present study was conducted in Huesca, which is a medium-sized Spanish city that lies in northeast Spain. Huesca has a population of 52,399 inhabitants with a residential density of 7,762.8 inhabitants/km^2.

All 12 primary schools in Huesca were invited to participate in this study. The research team contacted each school to provide information and the study procedure. This study forms part of a larger European project called CAPAS-Ciudad. The research project was approved by the Ethics Committee on Clinical Research of Aragón (Spain).

Sample

Eleven of 12 schools volunteered to take part in this study. Parents´ consent was obtained, and their anonymity and confidentiality were guaranteed. A sample of 1,560 children from 11 schools (7 public and 4 subsidised) from Huesca was recruited from February to May 2017. The data of those individuals who did not complete 75% of the questions or who did not report their postal address were discarded; thus the data of 327 individuals were deleted (20.96% of the data). Most participants lived within a 4-kilometre distance from school, except 21 children who lived outside the city (>4 km from school). Therefore, the data of these participants were eliminated as they were considered to live outside the city, which is a relevant barrier to independently commute to school. Moreover, the children aged 13 years and more were eliminated (a 1.35% criteria rate) to include only children, and not adolescents. The final sample was composed of 1,106 girls and boys (48.6% girls, 51.4% boys) aged 8-12 years old (M= 12.88; SD = 10.6), of whom 417, 372 and 323 were enrolled in course 4, 5 and 6, respectively, which corresponds to the 3rd, 4th, 5th and 6th US/International Grades.

Procedure

The questionnaire translation process was carried out from November 2016 to January 2017. Data were collected from February to May 2017. Two researchers handed out the paper-and-pencil questionnaires in each classroom. Privacy conditions were assured and data processing was conducted from June to October 2017.

Materials

The socio-demographic variables were self-reported by the children.

Different variables from the questionnaire called L'autonomía dei bambini, by Francesco Tonucci, Antonella Prisco, Daniella Renzi and Antonella Risotto (2002), were measured for this study. The authors applied for its translation. After receiving approval, this questionnaire was translated into Spanish by experts. In order to better focus the questions on children, and to make their wording more comprehensive and simple for them, we slightly adapted Tonucci´s et al. (2002) questionnaire. This adapted questionnaire has been previously used in other studies (Ayllón, Moyano, Lozano, and Cava, 2019; Prezza et al., 2010; Tonucci et al., 2002).

After considering all the above aspects and their importance in autonomy terms, the following variables were measured:

Distance from Home to School. Each participant reported his/her postal address as other studies have also done (Aibar-Solana, Mandic, Lanaspa, Gallardo, and Casterad, 2018; Rodríguez-López, et al., 2017). From this, the distance from home to school was calculated using the GoogleMaps software (expressed in metres) for each participant.

CIM to/from School. Students answered the following questions: *Who do you go to school more frequently with?* and *Who do you go from school more frequently with?*. For both questions, the answer options were a) father, b) mother, c) friends, d) grandparent, e) sibling, f) on my own, or g) someone else. A dichotomous variable was created to distinguish those

students unaccompanied by adults (CIM) when they answered any of the following options: friends, sibling or on my own, from those accompanied by adults (non-autonomous mobility) when they selected: father, mother, grandparent or someone else (any adult was specified). For statistical purposes, this variable was considered continuous, where higher scores indicated more independency ("1" = accompanied by adults and "2" = unaccompanied by adults). From this variable, we created a series of dummy variables to distinguish: CIM to *or* from school (*CIM-one way*), CIM to *and* from school (*CIM-both ways*) and non-autonomous mobility.

Perceived Distance to School. Students were asked: *Do you think school is far from or close to your home,* and students had to indicate "*far*" or "*close*" (Herrador Colmenero et al., 2017).

Perceived Difficulty for CIM to School. They were asked *Is it difficult for you to go to school with no adult accompaniment?* They had to answer "*Yes*" or "*No*" (Herrador Colmenero et al., 2017).

CIM for Outdoor Leisure Activities. The frequency of some outdoor leisure activities not supervised by adults was measured. We asked *How frequently do you do this activity without being accompanied by an adult?*. Activities were: 1) *visiting friends and out-of-school activities; 2) using public transport; 3) cycling around the neighbourhood; 4) buying from a shop;* 5) *playing outside (in a park or open spaces); 6) going out when it gets dark.* All these options were answered on a 4-point Likert scale as so: "*Never*", "*Sometimes*", "*Most of the time"* and "*Always*".

Having House keys. Given that having home keys is considered a demonstration of trust between parents and their children (Ayllón et al., 2019), which allows them to develop higher levels of maturity and responsibility, each student answered the following question: *Do you have the keys to your home?,* which had two answer options: "*Yes*" or "*No*".

Willingness and Reasons for CIM to School. As children´s desire and willingness are crucial for their own autonomy (Crane and Broome, 2017), we measured whether children would like to go to school with no adult accompaniment: *Even if you still do not go alone, would you like to go to school alone?*. The response answers were "*Yes*" or "*No*", along with what their reasons would be for both answers. For the "Yes" answers, they were provided with four reasons: *I would like to because*…: 1) *my parents would be freer;* 2) *I would be more autonomous*; 3) *I could learn more about my neighbourhood* and 4) *I could spend more time with my friends*.

Attitudes for Going to School. Students had to indicate whether they considered that walking to school was something: 1) *interesting-not interesting*; 2) *nice-not nice*; 3) *fun-not fun*; 4) *good-bad*; 5) *useful-useless;* 6) *safe-dangerous*. A 5-point scale was provided which ranged from 1 to 5, where 1 was the opposite concept of 5 (e.g., interesting: 1; not interesting: 5).

Statistical analyses

First at all, we considered whether there were gender differences in the examined variables by comparing CIM between boys and girls using the chi-square test. Secondly, descriptive statistics (mean and standard deviation) were performed for all the study variables. The percentages of the different CIM categories (i.e., non-autonomous, one way, and both ways) were calculated. To describe the participants as to their threshold distance, a ROC curve analysis (*Receiver Operating Characteristic*) was calculated based on mobility type (IM *vs.* non independent mobility) and distance from home to school. The Younden Index was calculated to obtain the threshold distance to differentiate children with IM from those with no IM. This distance was 575 m (the area under the curve was .63 [IC=.60 - .66]; $p < .001$). Overall, 783 children (70.4% of the total sample) lived within the threshold distance (47.8% girls).

MANOVA analyses were conducted by taking CIM type (i.e., *CIM one-way*, *CIM both-ways* and *non-autonomous children)* and threshold distance as the independent factors. Perceived distance from home to school, perceived difficulties for CIM, CIM for outdoor leisure activities, willingness and reasons for CIM to school and attitudes for going to school were included as the dependent variables. Intergroup comparisons were made using a paired t-test with Bonferroni correction.

Finally, in order to better know which variables were important to predict each CIM type, a series of stepwise multivariate hierarchical regression analyses were conducted. To do so, we created a series of new dichotomised variables: a) Children with CIM (one way) *versus* non-autonomous children; b) Children with CIM (both ways) *versus* non-autonomous children; c) one way *versus* both ways of children with CIM. All the analyses were performed by SPSS V. 22.0.

Results

First at all, no significant gender differences in CIM were found ($\chi^2 = 5.01$, $p = .082$). Therefore, no specific gender-based distinction was considered for further analyses.

Table 1 shows the descriptive statistics for the following variables: perceived distance to school; perceived difficulties for CIM; CIM for leisure activities; willingness and reasons for CIM to school; attitudes for going to school for each autonomy type. All these variables are also shown by the threshold distance within each autonomy type in Table 2. Almost half the sample independently commuted to school (49.8%). Of these, 21.3% indicated independently commuting one way, and 28.5% of children did so both ways. The comparisons for all the examined variables were made with a *post hoc* analysis.

We analysed whether the examined variables significantly differed according to the distance threshold. Overall, we found that those who lived within the threshold were more likely to consider the distance and time from home-school as being lower, and perceived less

difficulty for non-autonomy and CIM both ways. However, no significant differences were found for most of the examined variables based on the threshold within each CIM type, except for some variables; e.g. some reasons for no CIM and some autonomy for leisure activities and difficulties for the non-autonomous group and CIM-both ways.

Based on the level of autonomy, we found significant differences in the distance from home to school, perceived distance, perceived time to school and perceived difficulty for CIM to school, particularly due to bad connections from home areas and public transport, traffic, fear of getting lost or hurt, having to carry a heavy bag, frequency for CIM to school, performing several leisure activities with no adult accompaniment, their willingness to go to school alone and perceived safety. Overall, differences were found between no autonomy and CIM (both ways), although significant differences were found across all the autonomy types or the following variables: distance home-school, perceived distance, time to school, all types of autonomous leisure activities and willingness to go to school alone. CIM-both ways, unlike non-autonomous and, for the indicated variables, CIM-one way, perceived a shorter distance, fewer difficulties for CIM, and more leisure activities with no adult accompaniment.

No significant differences were found for most of the examined variables according to the threshold within each CIM type, except for some variables, such as some reasons for no CIM and some autonomy for leisure activities and difficulties for the non-autonomous group and CIM both ways.

Finally, when we analysed the predictor variables for each CIM type, we found that the predictors for CIM-one way, unlike non-autonomy, were: less perceived difficulty, older age, considering the way to school fun and less perception of difficulty for CIM in public places (see Table 3). To predict CIM-both ways, and unlike non-autonomy, the strongest predictor variable was children´s willingness to go to school by themselves, followed by them wishing their parents to be freer, older age and having their home keys (see Table 4). Taken together,

while CIM-one way was associated with variables about less perception of difficulties or barriers, CIM-both ways was associated with variables about pro-active motivations and children´s willingness to be independent and autonomous.

Discussion

The main goal of the present study was to analyze some factors associated with children´s independent mobility (CIM), unaccompanied by adults, by considering several CIM types; that is, children who go to *or* from school (*one way*) and children who commute go to *and* from school (*both ways*). We previously considered the threshold for CIM specifically for our sample. A threshold distance that equalled 575 metres was considered appropriate for the CIM in our sample (children aged 8-12 years). Unlike previous research about active commuting, our threshold for CIM was lower than that reported by Aibar-Solana et al. (2018), who established a threshold distance for walking to school of 875 m, and was also lower than that reported by Rodríguez-Lopez et al. (2017). Therefore, the specific thresholds for the sample analysed in each study should be provided as no specific cut-off or generalisable standard exists.

From our sample, 49.8% of the children indicated going *to* or *from* school unaccompanied by adults, of whom 42.7% indicated independently commuting only one way, and 57.2% indicated independently commuting both ways. Previous research has recently shown a sharp decline in CIM mobility across several countries (see Shaw et al., 2013; Zubrick, et al., 2010). Specifically a study in Australia (Schoeppe et al., 2015), which investigated CIM changes in 8-13-year olds, found that diminishing proportions of children were allowed to travel independently to school (dropped from 61% to 32%), and from school alone (from 68% to 31%) and who were allowed to go on a bus unsupervised (from 31% to 9%). Similarly in Finland, declines have been reported for children aged 7-15 years (Kyttä, Hirvonen, Rudner, Pirjola, and Laatikainen, 2015). The same happens with other European

countries, such as France, Portugal and Italy (Shaw et al., 2015) and, in particular, research in Italy has shown comparable results (Prezza, 2007). However, our data indicate a good CIM rate with around 50% of the children independently commuting to school on at least one trip. Our findings are consistent with those previously found in Spain, where 47% for the children aged 6-7 years and 60% of those in the 8-12 age group independently commuted to school (Herrador-Colmenero et al., 2017). Therefore, our CIM rate fell within the range shown in previous studies conducted in Spain. However, by taking into account that the percentages of active commuting to school are higher, between 76% and 90% in Switzerland (Bringolf-Isler et al., 2008) and Norway (Ostergaad, Kolle, Steene-Johannessen, Andersseen and Andersen, 2013), there is still margin for improvement to increase the prevalence of such behaviour (CIM).

Children who independently move to school also independently perform outdoor leisure activities and have more positive attitudes towards their CIM. In particular, younger children perceive their experience as being safer than those who do not independently commute. Consistently, previous research shows that children who independently go to school enjoy greater autonomy to use and explore public spaces (Brown, et al., 2008; Prezza et al., 2010; Veitch, et al., 2014). Regarding attitudes, the Spanish children who commute to school unaccompanied more frequently perceive it as being safe than those who are accompanied (Herrador-Colmenero et al., 2017). Therefore, when children perceive walking to school as being convenient or "safe", the odds of them walking alone to school increase (Rodríguez and Vogt, 2009). Together, the experience of CIM-*both ways* seems related to lower levels of children´s perceptions of fear for their safety. This is particularly interesting if we consider that safety perceptions are one of parents´ main barriers to allow children to freely commute (Crawford et al., 2017; Santos, Pizarro, Mota, and Marques, 2013; Schoeppe et al., 2015; Veitch, Bagley, Ball, and Salmon, 2006; Villanueva et al., 2014). It is likely that

this is one of the more openly negotiated aspects between children and parents and, therefore, children have incorporated safety into their experience assessment.

Several differences were observed for the determinants of the different CIM categories (i.e., one way, both ways, and non-autonomous). Our findings generally showed that children with greater CIM–*both ways* also independently performed more outdoor leisure activities, perceived their home as being closer and indicated fewer difficulties for their free mobility compared to those who independently commuted to school only one way. In addition, the children who independently commuted both ways perceived walking to school as being more useful and safer than those accompanied by adults. Taken together, CIM–*both ways* emerged as a greater (or more satisfactory) form of CIM as it was linked to facilitators and more CIM for other leisure activities. Besides, this result could include establishing children´s preferences as to how to independently travel to school by allowing them to choose how to travel and to become aware of children´s and parents' perceived safety issues on the route to school (Grolnick, 2009).

We found different factors when we analysed the significant determinants of CIM for its categories (i.e., one way, both ways, and non-autonomous). Perceived difficulty, perception of little difficulty in public places, attitude, fun, and age were the main predictors of CIM to school-*one way*. As shown above in the analysis of differences, the children who independently travelled to school one way perceived less difficulty on route to school and in public spaces, and displayed more positive attitudes towards their CIM. Indeed the children who travelled independently or were accompanied by siblings or peers on their trips to school reported showing more interest than those accompanied by parents (Romero, 2010). Besides, age came over as a predictor factor and research indicates that CIM increased as children matured (Prezza, 2007).

The main predictors of CIM to school-*both ways* were: having house keys, age and the desire to go to school alone. We believe that when parents perceive that their children are responsible enough to carry the keys to their homes and value their desire to go to school alone as positive, because they are the appropriate age to do so or parents perceive them as being mature enough, then children are no longer perceived as innocent people that need protection and surveillance. Consequently, parents may allow decision making about mobility to and from school and, thus, their IM may increase (Fusco et al., 2012). Moreover, age emerged as a predictor factor. Accordingly, parental judgments of their child´s ability to move outside their home determined the age at which certain levels of CIM were granted (Johansson, 2006). As shown by Herrador-Colmenero et al. (2017), the CIM rate rose to 60% for the 8-12 years age range, which means that a turning point appears at these ages. Another significant predictor was the perspective of greater freedom for parents. This variable, together with the "desire to go to school alone", suggested how children could participate in developing and negotiating their everyday mobility with their parents (Nansen et al., 2015). Therefore, it would be highly recommended for parents to take these results into account by allowing their children to participate in decision making as to how to embark on their daily route to school because, in accordance with Stevenson (2017), children´s independence is associated with educational success, self-regulated learning and CIM.

Some limitations should be noted. First at all, the sample may not be representative of all Spanish children as our participants came from one particular city in Spain. Therefore, the results may not be generalisable. Accordingly, Huesca has two main characteristics that may favour CIM: a) its size and infrastructure as it is among the smallest cities of Spain in terms of both its size and population density (National Statistics Institute, 2019). This circumstance is a facilitator in the built environment for CIM (Sharmin and Kamruzzaman, 2017); b) the main streets from the city centre are pedestrian, which significantly reduces

some likely risks and barriers like crossing roads or traffic (Ghekiere et al., 2017); c) it is actively involved in the "City of Children" network (see Tonucci et al., 2002), and several programmes such as "We go to school alone" have been developed, which have proven to increase independent mobility (Prezza et al., 2010). Future research should extend sample recruitment to other cities of Spain or Europe with different characteristics. Secondly, our research design was cross-sectional and correlational. Hence no causal effects could be established. Longitudinal studies would better keep track of individuals and better understand this phenomenon. Finally, future studies should consider both parents´ and children´s perspectives, and how both negotiate or make decisions about CIM. Perhaps it could be extended with a qualitative analysis perspective.

Conclusions

This study provides useful information by making a distinction between several CIM forms. Therefore, CIM-both is highlighted as a form to satisfactorily promote autonomy because it has been shown to be associated with several aspects that clearly favour children´s autonomy and independency. In particular, these relevant variables are: having one's home keys and a change in parents' attitude, which takes into account children´s wishes and opinions when making decisions about the way they travel to school daily.

By way of conclusion, it should be highlighted that CIM is a complex behaviour that is determined by a variety of factors from different levels of influence (e.g., individual and neighbourhood levels). Our study reinforces the idea that in order to identify how best to develop and monitor interventions to halt lowering CIM rates, intervention programmes should be designed and supported within robust theoretical frameworks such as Badland and colleagues' (2016) model. Including this socio-ecological perspective in different contexts should improve the comprehension and effectiveness of CIM intervention programmes.

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Table 1. Descriptive statistics of the examined variables by types of children´s independent mobility.

Dependent Variables	Non-autonomous children (*n*=555, 50.2%)	Children with independent mobility (one way) (*n*=236, 21.3%)	Children with independent mobility (both ways) (*n*=315, 28.5%)	
	All	All	All	
	n (%)	*n (%)*	*n (%)*	χ^2
Gender				5.01
Boys	259 (48.1)	109(20.3)	170(31.6)	
Girls	296 (52.1)	127(22.4)	145(25.5)	
	M(SD)	*M(SD)*	*M(SD)*	*F*
Perceived distance home-school (kms.)	862.83 (563.56)c	740.20 (506.31)b	531.30 (401.20)a	42.48***
Perceived distance home-to-school (far = 1, close = 2)	1.67 (0.48)a	1.72 (0.47)a	1.85 (0.37)b	16.24***
Perceived time home-to-school (1 =less than 5 minutes to 4 = from 30 to 60 minutes)	1.79 (0.74)b	1.79 (0.76)b	1.59 (0.68)a	8.42***
Perceived difficulties for CIM (yes = 1, no =0)				
Perceived difficulty	0.28 (0.47)b	0.08 (0.30)a	0.05 (0.23)a	42.66***
Bad connection home-school	0.12 (0.33)b	0.09 (0.29)	0.07 (0.25)a	4.02*
Bad weather	0.03 (0.17)	0.02 (0.14)	0.02 (0.16)	.30
Traffic dangers	0.22 (0.41)b	0.19 (0.39)	0.13 (0.33)a	5.55**
Get lost	0.07 (0.26)b	0.46 (0.21)	0.01 (0.12)a	6.37*
Get hurt	0.02 (0.14)b	0.00 (0.65)	0.00 (0.00)a	4.80*
Meet strangers	0.00 (0.08)	0.00 (0.09)	0.00 (0.05)	.36
Heavy bag	0.06 (0.24)	0.04 (0.20)	0.00 (0.07)	8.03***

CIM for Leisure outdoor activities (1 = never to 4 = always)				
Go out for leisure activities	1.93 (1.01)a	2.73 (1.10)b	2.63 (1.09)b	52.50***
Using public transport	1.17 (0.50)a	1.29 (0.67)b	1.47 (0.88)b	11.67***
Cycling	1.48 (0.79)a	2.00 (1.09)b	2.11 (0.88)b	36.79***
Shopping	2.05 (0.81)a	2.51 (0.89)b	2.61 (0.88)b	32.52***
Outdoor spaces, parks	1.75 (0.91)a	2.42 (1.01)b	2.60 (1.02)b	58.22***
Going out at dark	1.23 (0.53)a	1.58 (0.94)b	1.63 (0.86)b	28.96***
Possession of home keys	1.85 (1.18)a	3.01 (1.22)b	2.97 (1.25)b	88.35***
Willingness for CIM to school (yes = 1, no = 0)	1.22 (0.43)c	0.95 (0.36)a	1.02 (0.34)b	15.97***
Attitudes for going to school (1 = not at all to 5= very much)				
Interesting	3.41 (1.32)	3.25 (1.39)	3.67 (1.28)	.76
Nice	1.72 (1.11)	1.68 (1.15)	1.75 (1.20)	.03
Funny	3.66 (1.25)	3.59 (1.29)	3.83 (1.22)	.90
Good	4.32 (0.97)	4.45 (0.90)	4.32 (0.99)	1.90
Useful	4.27 (1.06)	4.46 (0.91)	4.40 (0.99)	2.75
Safe	3.74 (1.2)a	3.94 (1.17)	4.03 (1.08)b	3.71*

Note. Different subscripts indicate significant differences between means ($p < .05$): a < b < c. ** $p < .05$; ** $p < .01$; *** $p < .001$

Table 2. Descriptive statistics of the examined variables by types of children´s independent mobility and threshold distance.

Dependent Variables	Non-autonomous children (*n*=555, 50.2%)			Children with independent mobility (one way) (*n*=236, 21.3%)			Children with independent mobility (both ways) (*n*=315, 28.5%)		
	< 575	> 575	χ^2	< 575	>575	χ^2	< 575	>575	χ^2
Gender									
Boys	100(37.6)	159(58.5)	1.05	51(19.2)	58(21.3)	1.07	115(43.2)	55(20.2)	.07
Girls	127(43.6)	169(61)		68 (23.4)	59(21.3)		96(33)	49(17.7)	
	M(SD)	*M(SD)*	*F*	*M(SD)*	*M(SD)*	*F*	*M(SD)*	*M(SD)*	*F*
Perceived distance home-school (kms.)	362.85 (132.41)	1,208.84 (482.03)	664.17***	350.73 (143.83)	1136.32 (429.44)	357.46***	308.58 (144.80)	983.17 (374.40)	526.64***
Perceived distance home-to-school (far = 1, close = 2)	1.94 (0.26)	1.48 (0.51)	151.40***	1.94 (0.25)	1.50 (0.53)	66.85***	1.95 (0.26)	1.64 (0.48)	55.59***
Perceived time home-to-school (1 = < 5 minutes to 4 = 30- 60 minutes)	1.33 (0.50)	2.11 (0.70)	203.44***	1.36 (0.51)	2.23 (0.70)	115.82***	1.31 (0.48)	2.15 (0.65)	166.17***
Perceived difficulties for CIM (yes = 1, no = 0)									
Perceived difficulty (yes = 1, no =0)	0.18 (0.43)	0.35 (0.49)	17.92***	0.05 (0.25)	0.12 (0.33)	3.86	0.03 (0.17)	0.10 (0.30)	0.84
Bad connection home-school	0.14 (0.34)	0.11 (0.32)	0.76	0.84 (0.27)	0.10 (0.30)	0.23	0.07 (0.25)	0.05 (0.23)	0.20
Bad weather	0.02 (0.16)	0.03 (0.18)	0.22	0.03 (0.18)	0.00 (0.09)	1.78	0.03 (0.17)	0.00 (0.09)	1.56
Traffic dangers	0.18 (0.38)	0.24 (0.38)	3.15	0.15 (0.36)	0.21 (0.41)	1.13	0.10 (0.31)	0.16 (0.37)	1.86
Get lost	0.07 (0.25)	0.07 (0.25)	0	0.05 (0.23)	0.03 (0.18)	0.80	0.14 (0.11)	0.01 (0.13)	0.11
Get hurt	0.02 (0.14)	0.02 (0.14)	0.00	0.00 (0.09)	0.00 (0.00)	0.98	0.00 (0.00)	0.00 (0.00)	0.49
Meet strangers	0.00 (0.06)	0.00 (0.09)	0.42	0.00 (0.00)	0.01 (0.13)	2.05	0.00 (0.06)	0.00 (0.00)	0.26
Heavy bag	0.09 (0.29)	0.03 (0.19)	7.52**	0.06 (0.25)	0.01 (0.13)	3.68	0.00 (0.06)	0.00 (0.09)	6.85**
CIM for Leisure outdoor activities (1 = never to 4 = always)									

Go out for leisure activities	2.09 (1.09)	1.83 (0.95)	8.94**	2.81 (1.04)	2.36 (1.03)	0	0.54	52.50***	0.54
Using public transport	1.14 (0.48)	1.18 (0.52)	1.03	1.13 (0.54)	1.15 (0.45)	0.08	4.11*	11.67***	4.11*
Cycling	1.48 (0.80)	1.48 (0.78)	0.00	1.57 (0.79)	1.76 (0.94)	2.906	0.77	36.79***	0.77
Shopping	2.01 (0.79)	2.08 (0.83)	1.13	2.24 (0.91)	2.37 (0.95)	1.145	0.82	32.52***	0.82
Outdoor spaces, parks	1.72 (0.90)	1.78 (0.92)	0.57	2.16 (1.00)	2.08 (0.97)	0.351	2.21	58.22***	2.21
Going out at dark	1.20 (0.50)	1.25 (0.55)	1.49	1.33 (0.71)	1.31 (0.59)	0.09	0.14	28.96***	0.14
Possession of home keys	1.91 (1.23)	1.80 (1.15)	0.98	2.38 (1.34)	2.58 (1.35)	1.175	0.08	88.35***	0.08
Willingness for CIM to school (yes = 1, no = 0)	1.27 (0.46)	1.19 (0.41)	3.43	1.12 (0.55)	1.08 (0.39)	0.247	1.07	15.97***	1.07
Attitudes for going to school (1 = not at all to 5= very much)									
Interesting	3.37 (1.32)	3.43 (1.33)	0.26	3.41 (1.28)	3.65 (1.21)	1.98	3.24	3.67	6.59*
Nice	1.67 (1.08)	1.75 (1.14)	0.62*	1.65 (1.14)	1.82 (1.21)	1.07	1,67	1,73	0.27
Funny	3.69 (1.20)	3.64 (1.29)	0.17	3.71 (1.29)	3.89 (1.28)	1.14	3.59	3.83	2.37
Good	4.33 (0.97)	4.32 (0.97)	0.03	4.56 (0.86)	4.37 (0.97)	2.29	4.44	4.33	1.39
Useful	4.29 (1.04)	4.25 (1.07)	0.13	4.43 (0.87)	4.25 (1.07)	1.76	4.46	4.38	0.35
Safe	3.81 (1.21)	3.68 (1.20)	1.40	3.77 (1.30)	3.75 (1.29)	0.01	3.94	4.03	0.39

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. Hierarchical regression analysis for the prediction of children´s independent mobility-one-way

Step	Variables	B	SE	p-value	Exp(b)
1	Perceived difficulty	-1.58	.65	.014	.20
2	Perceived difficulty	-1.49	.65	.022	.22
	Low difficulty perception in public places	-.46	.20	.024	.62
3	Perceived difficulty	-1.46	.64	.022	.23
	Attitude: Funny	.41	.20	.043	1.51
	Low difficulty perception in public places	-.45	.20	.030	.63
4	Perceived difficulty	-1.37	.64	.033	.25
	Attitude: Funny	.43	.21	.042	1.54
	Low difficulty perception in public places	-.42	.21	.045	.65
	Age	.51	.26	.047	1.67

Table 4. Hierarchical regression analysis for the prediction of children´s independent mobility-both ways

Step	Variables	B	SE	p-value	Exp(b)
1	Possess home keys	.65	.19	.001	1.92
2	Possess home keys	.50	.20	.016	1.65
	Age	.78	.32	.015	2.19
3	Possess home keys	.57	.22	.010	1.77
	Willingness to go to school by oneself	-2.07	.98	.034	.12
	Age	.72	.34	.037	2.06
4	Possess home keys home keys	.655	.22	.004	1.92
	Willingness to go to school by oneself	-2.66	1.02	.010	.07
	Age	.72	.35	.039	2.06
	My parents be more free	-2.08	.83	.012	.125